



An evaluation of the effect of greenhouse gas accounting methods on a marginal abatement cost curve for Irish agricultural greenhouse gas emissions

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Abstract:

Marginal abatement cost curve (MACC) analysis allows the evaluation of strategies to reduce agricultural greenhouse gas (GHG) emissions relative to some reference scenario and encompasses their costs or benefits. A popular approach to quantify the potential to abate national agricultural emissions is the Intergovernmental Panel on Climate Change guidelines for national GHG inventories (IPCC-NI method). This methodology is the standard for assessing compliance with binding national GHG reduction targets and uses a sector based framework to attribute emissions. There is however an alternative to the IPCC-NI method, known as life cycle assessment (LCA), which is the preferred method to assess the GHG intensity of food production (kg of GHG/unit of food). The purpose of this study was to compare the effect of using the IPCC-NI and LCA methodologies when completing a MACC analysis of national agricultural GHG emissions. The MACC was applied to the Irish agricultural sector and mitigation measures were only constrained by the biophysical environment. The reference scenario chosen assumed that the 2020 growth targets set by the Irish agricultural industry would be achieved. The comparison of methodologies showed that only 1.1 Mt of the annual GHG abatement potential that can be achieved at zero or negative cost could be attributed to agricultural sector using the IPCC-NI method, which was only 44% of the zero or negative cost abatement potential attributed to the sector using the LCA method. The difference between methodologies was because the IPCC-NI method attributes the abatement from agricultural mitigation measures, partially or fully, to other sectors within a nation or to activity taking place in other countries. This suggests that it may be politically difficult to justify to farmers that mitigation measures should be adopted in agriculture, if the accounting process does not credit this mitigation to them. The disagreement between methodologies also indicates that unilateral national or regional policies to reduce agricultural GHG emissions based on the IPCC-NI method could lead to mitigation options that increase global emissions (carbon leakage). The limitations of the IPCC-NI method for assessing national agricultural GHG emissions could be overcome by reforming or expanding the accounting methodology to include domestic offsetting and to assess emissions associated with national consumption via LCA. This would overcome the problem of carbon leakage and credit (in part) agricultural practices that reduce emissions in other sectors or nations without emission caps.

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Resource Description

Climate Scenario : RCP4.5

Climate Change and Human Health Literature Portal

specification of climate scenario (set of assumptions about future states related to climate)

Other Climate Scenario

Other Climate Scenario: Food Harvest 2020 scenario

Exposure : 

weather or climate related pathway by which climate change affects health

Air Pollution, Food/Water Security, Unspecified Exposure

Food/Water Security: Agricultural Productivity, Livestock Productivity

Geographic Feature: 

resource focuses on specific type of geography

Rural

Geographic Location: 

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Ireland

Health Impact: 

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: 

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology: 

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction, Methodology

Resource Type: 

format or standard characteristic of resource

Research Article

Timescale: 

time period studied

Short-Term (